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ABSTRACT

A study was conducted in an effort to demonstrate the potential usefulness and versatility of immediate feedback for direct teacher training. Subjects were two fourth grade teachers who wore electronic earphone speakers in their social studies classes. One, with 12 years experience, taught geography to each class separately in daily 30-minute periods; the other, with one year experience, taught history to the classes twice weekly for 20-minute periods. Classes were tape recorded for one week to obtain a baseline sample of question strategies. For the 3-week intervention phase teachers were told that when they set up a situation which encouraged the children to use higher level thought processes, that was good, and they would be signaled. Feedback was immediately provided for all questions above the knowledge category (based on Bloom's taxonomy). After 3 weeks of post-experiment recording without feedback, tapes were analyzed for questioning strategy. Data indicated that both teachers increased their use of high order questions to an acceptable level (a marked change in the desired direction) which continued during the post-test probes. Results suggest that electronic training techniques could economically and effectively supplement the usual student experience and could be used with experienced classroom teachers for skill enhancement. (Author/JS)

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APPLIED BEHAVIOR CHANGE PROJECT

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Title: Raising the level of teacher questions by immediate systematic feedback.

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Abstract: In an effort to demonstrate the potential usefulness and versatility of immediate feedback for direct teacher training, two fourth grade teachers wore electronic earphone speakers in social studies classes. Whenever they used high order questioning strategies they were given immediate feedback without disrupting the class. Data indicate that both teachers increased their use of high order questions to an acceptable level after three weeks of intervention with feedback. Results suggest that electronic training techniques could economically and effectively suppliment the usual student teaching experience and could be used with experienced classroom teachers for skill enhancement.

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RAISING THE LEVEL OF TEACHER QUESTIONS BY IMMEDIATE SYSTEMATIC FEEDBACK

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Effective acquisition of the variety of complex skills necessary for successful classroom teaching is a subject of basic concern in education. There is evidence from teachers themselves that much of their formal college preparation was not directly relevant or helpful when they were faced with the classroom situation. Direct experience, such as student teaching, which typically lasts six to eighteen weeks, has been found more useful than much of the more extensive formal course work in education (Footlick, 1966).

Unfortunately, a significant increase in the amount of direct student teaching experience is probably not a feasible solution. The sheer magnitude of the problem is overwhelming since more than 200,000 new teachers are graduated in a year (Footlick, 1966). If the experience of student teaching were extended, the burden of participating schools would be increased unreasonably in many cases.

Furthermore, there is no assurance that the particular classroom experience a student teacher would get would be the most useful and relevant from the educator's point of view. Even a master teacher expressly chosen to train student teachers would not likely be a master in all areas of teaching. It would be extremely difficult to prescribe selective experiences with a variety of master teachers who are expert at particular skills and not at others.

Feedback presents additional problems in student teaching. The relative inefficiency involved in the way students learn about their own classroom performance presents severe limitations for the techniques of direct training. The feedback may be specific or general, and the student may be able to learn desired teaching patterns from the feedback, or he may not. Perhaps the critical element influencing the effectiveness of feedback is the length of delay between the student teacher's behavior

and when the feedback is given. Ordinarily it may be hours or days between the student's actual performance and the feedback he gets. Seldom is it seen as possible or desirable to give a student immediate feedback while the actual behavior is going on. It would be disruptive to stop the student in the middle of a presentation to criticize or praise the way material is handled, and indeed the reactions of both student teacher and pupils could be detrimental to the purpose of the classroom experience. To say that the potential for trauma is great would be an understatement, especially considering that the typical feedback given under such circumstances tends to be critical or punitive rather than lauditory or rewarding. Consequently, feedback about performance is delayed so long as to be of little value with regard to learning specific teaching skills.

A promising technique which may overcome the problems of magnitude and selective experience, and which provides immediate feedback for the student teacher, has been made feasible by advances in electronic technology. Prompting and immediate feedback without disruption to the class, and with minimal disturbance to the student teacher, can be implemented with radio communication to the student through an earplug speaker, Several variations in the specific equipment include the walkie-talkie, the pocket transistor receiver, and the "bug in the ear" (Schwitzgebel, 1968).

Prompting is a technique which has been used to train child workers and experimenters while in an ongoing situation with children. Baer (1961) reported the use of an earphone receiver to instruct an adult to make specific statements while interacting with a child. Psychotherapists and parents have been trained to more effectively deal with children by following instructions given by a therapist observing from an adjoining room (R. A. Sanders, 1966; Welsh, 1966; Krapfl, et al., 1968).

Immediate feedback may be given in addition to prompting or as a separate technique. Patterson, et al. (1965) reinforced quiet classroom behavior in a brain-injured hyperactive ten-year-old boy by giving him a buzz over his receiver earphone as feedback when sitting still. The buzz indicated that he earned a piece of candy for quiet,appropriate classroom behavior.

If a variety of behaviors can be demonstrably enhanced through immediate feedback, it would appear that the educator has at his disposal a powerful technical aid to teacher training. In order to start exploring the utility of immediate feedback in a classroom, it was decided that a significant teaching skill should be chosen. Consequently, the teacher's questioning strategies were selected for further exploration and study.

Questioning strategies have been classified and studied in relation to the intellectual objectives of education. Bloom's Taxonomy of Educational Objectives (1956) presents a basic classificatory system which has been elaborated into a hierarchy of complexity and inclusiveness. Assuming that a relationship exists between teachers' questions and children's responses, there is some agreement that at least one-third of a teacher's questions should be comprehension and higher-order types, as opposed to lower-order knowledge or memory types (N. M. Sanders, 1966; Farley & Clegg, 1967).

Observations of classroom questioning by elementary teachers at all levels indicates the proportion of lower-level questions to be as high as 98% for "direct" teachers and about 42% for "indirect" (Amidon & Amidon, 1969).

The types of questions asked may be a function of factors other than the training given the teacher regarding questioning strategies. Quite possibly the teacher is influenced by the speed and responsivity of his pupils in the classroom. Memory and knowledge questions elicit a high rate of response, which may give the teacher a feeling of accomplishment, rapport, and success, but which may have little value in terms of developing the children's thinking skills. A high rate of classroom activity may actually amount to no more than "busy work." On the other hand, when things move more slowly and the response rate is not so high, the teacher may feel less adequate, but may actually be providing the type of situation for the children to develop higher order cognitive processes.

The present study was an effort to test the feasibility of an immediate feedback system to strengthen the higher-order questioning skills of two fourth grade teachers. No effort was made to prompt the teachers and neither teacher was given any instruction about questioning strategies

or the purpose of the study. It was decided that special training could be given if immediate feedback did not strengthen the desired skill. Essentially the feedback represented a responsive audience rather than a guide to questioning strategies.

Method

Two fourth grade level classrooms in a private school were the settings for the study. Each class of eighteen pupils is described as coming from a relatively homogeneous middle class background, but their work characteristics were described as being markedly different by staff and teachers.

Of the two fourth grade teachers, Miss X had twelve years teaching experience, while Miss Y had one year. Miss X taught geography to each class separately in daily thirty-minute periods. Miss Y taught history to the classes twice weekly for twenty minute periods. History and geography were selected as the types of subjects in which questioning strategy could be identified and measured.

Procedure

History and geography classes were tape recorded during the first week of the study to obtain a sample of the questioning strategies and to help the teachers adapt to the experimental situation. Four judges independently sorted questions into categories based on Bloom's Taxonomy. Questions were defined in terms of "teacher-initiated verbal behavior calling for a pupil response," omitting all procedural questions, statements, quotations or paraphrases from the children's text, and items not related to the social studies lesson content. Inter-judge agreement ranged from seventy-five percent to 100%, with a modal agreement of 100% for four judges. Data from the first week of monitoring were used as baseline.

During the intervention phase of the study, feedback was immediately provided for all questions above the knowledge category. The only instructions provided the teacher were: "We are interested in the way children think. When you set up a situation which gets the children to use higher level thought processes, that is good and we will signal you." The signal consisted of a "beep" through an earphone via a walkie-talkie worn by the teacher.

The teacher's voice was carried by a small FM transmitter to a receiver in the adjoining room, and was tape-recorded. Usually two judges monitored the teacher's class and signaled whenever a high-level question was asked by the teacher. The intervention phase lasted three weeks, followed by approximately one and one-half weeks of no intervention (partly due to school closure for snow) and three weeks of post experimental recording without feedback. In terms of number of teaching periods involved, Table 1 shows that Miss X was monitored for 30 periods, of which 16 were occasions for intervention. Miss Y was monitored 19 periods and had 11 intervention periods. The time span was ten weeks from baseline to final post-test probe, including vacation and school closure due to snow.

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Insert Table 1 about here

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Results

Each classroom period was analyzed from the tapes independently for questioning strategy. A period was judged to meet the criterion of adequacy if 33% or more of the teacher's questions were considered to fall at or above the comprehension level. Percentage of monitored periods meeting the criterion was computed on a weekly basis. Table 1 shows the similarity of teaching strategies used by both teachers over the 10 week span.

In general, the more experienced teacher seemed to have more periods at the criterion level in the early stages of the study, but both teachers dropped their level of questioning during the second week of intervention. This may be due to a change in teaching style which seemed to be taking place during this week. Wearing the communication apparatus was cumbersome and the novelty effects of the experiment had worn off. Subjectively, the teachers reported some discomfort at this time and there was an apparent transition in questioning behavior taking place. The third week of intervention was described by the observers as a "breakthrough," during which the teachers' rates of higher-level questioning picked up markedly. The post-test probes showed that the high level questioning strategies continued at a satisfactory rate for the next three weeks when the study was terminated.

Conclusion

Results from this pilot study of the effects of immediate feedback on a teacher's questioning strategies indicate a marked change in the desired direction. The change in percentage of weekly periods meeting a criterion of higher order questioning shows a similar progression for two teachers having different amounts of teaching experience. Since no attempt was made to reverse the direction of questioning strategy or to control for other possible extraneous effects (such as the school closures) the results are not considered to be a critical test of a technique. Nevertheless, the available evidence is compelling and a replication of the experiment should indicate the reliability of these results.

The versatility offered by electronic devices for immediate feedback gives the educator a potentially powerful technique for training student teachers while in the teaching situation. This pilot study indicates that experienced teachers may also be effectively trained in specific areas of classroom teaching without seriously disrupting their ongoing teaching situation.

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Table 1

Number of Teaching Periods Monitored and Percent of Periods Meeting Minimal Standards of Questioning Over a Ten Week Span

Periods		Week										
		1[a]	2[b]	3[b]	4[c]	5[c]	6[c]	7[d]	8[e]	9[e]	10[e]	
Teacher X	No.	7	-	-	4	8	4	-	3	1	3	
	%	43	-	-	50	25	75	-	100	100	100	
Y	No.	4	-	-	4	3	4	-	2	-	2	
	%	25	-	-	25	00	75	-	100	-	100	

a Baserates, no intervention.

b School closed for holidays.

c Intervention periods.

d School closed for snow.

e Post-intervention probes.